US005593307A

United States Patent [19]

Bale et al.

[11] **Patent Number: 5,593,307**

[45] **Date of Patent: Jan. 14, 1997**

[54] **CONNECTOR INCLUDING AN INSULATIVE BRIDGE**

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[21] Appl. No.: **325,656**

[22] Filed: **Oct. 18, 1994**

[30] **Foreign Application Priority Data**

Oct. 19, 1993 [FR] France 93 12445

[51] **Int. Cl.**^{6} **H01R 23/70**

[52] **U.S. Cl.** **439/79**; 439/567

[58] **Field of Search** 439/79, 80, 567

[56] **References Cited**

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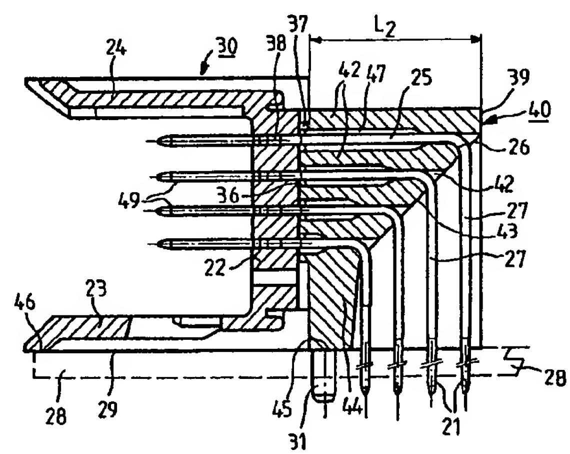
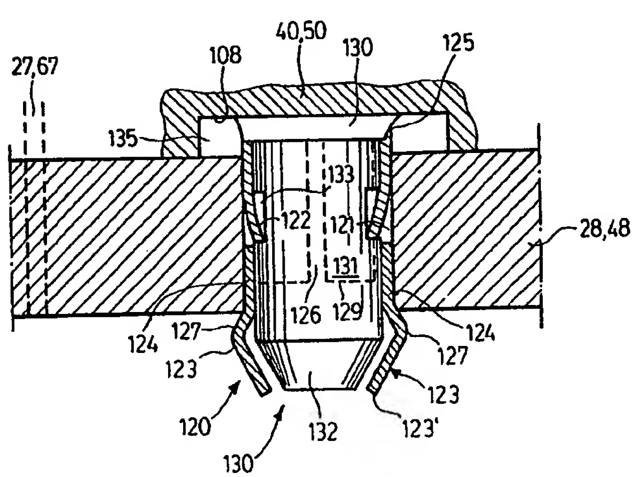
[57] **ABSTRACT**

A connector includes an insulative bridge having a U-shape cross-section, i.e., a central region and two lateral branches, and elbow electrical contact members. The contact members have front contact regions housed in openings of the central region of the bridge and elbow regions and rear contact regions. The connector also includes a retaining peg for fixing it to a flat support and a rear insulative body surrounding the electrical contact members in at least one area between the front contact region and the elbow region. The retaining peg is fastened to one side of the rear insulative body.

9 Claims, 2 Drawing Sheets





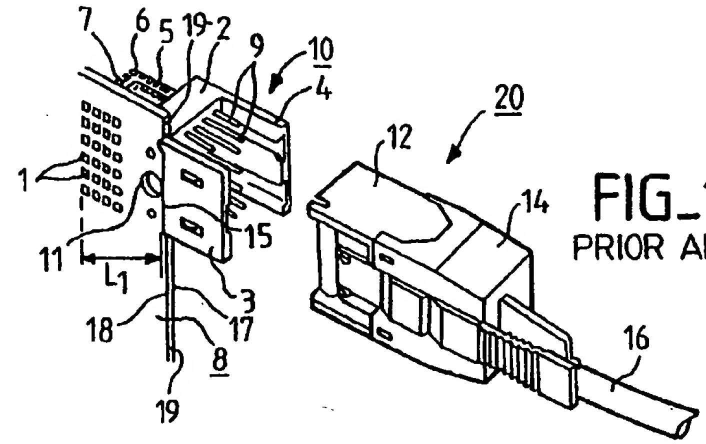


FIG_1
PRIOR ART

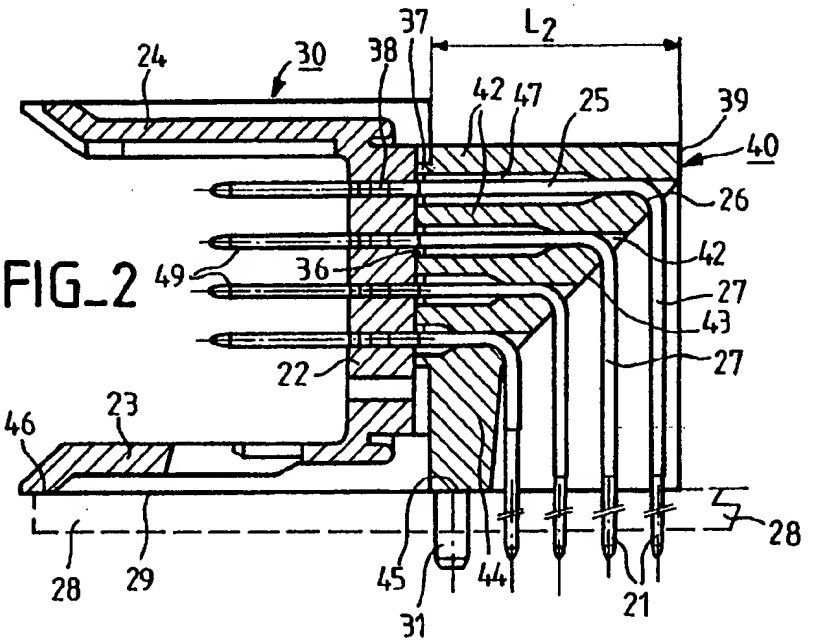


FIG_2

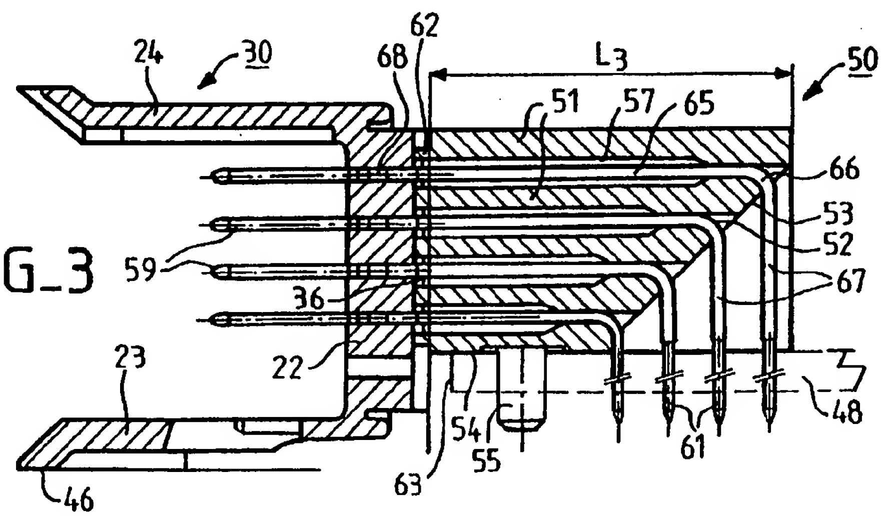


FIG_3

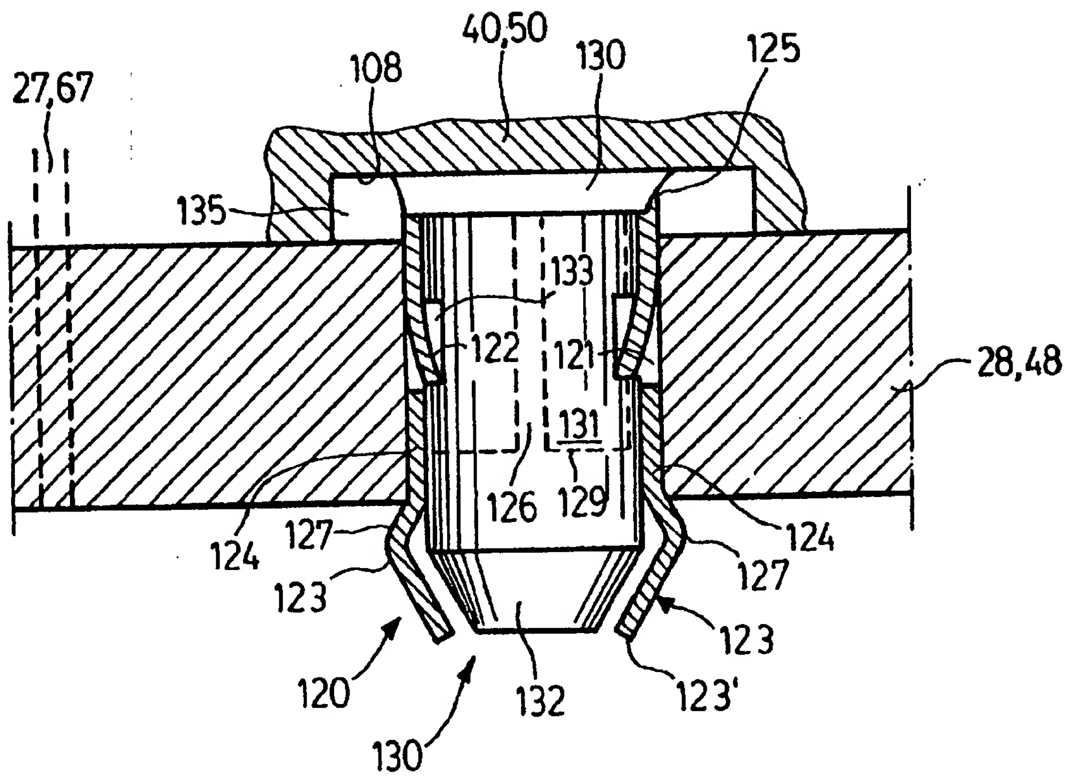

40,50
130
125
108
27,67
135
133
122
121
28,48
131
126
129
124
127
124
127
123
123
120
132
123'
130

FIG_4

CONNECTOR INCLUDING AN INSULATIVE BRIDGE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention concerns a connector including an insulative bridge having a U-shape cross-section, i.e., a central region and two lateral branches, elbow electrical contact members having front contact regions housed in openings in the central region of the bridge, elbow regions and rear contact regions, and a retaining peg, for example a peg of the type that can be deformed by heat to fix the connector to a flat support.

2. Description of the Prior Art

A connector of the aforementioned type is marketed by Dupont under the trademark "METRAL". It includes a bridge having a relatively massive central region which carries a peg that can be deformed by heat. Mechanical stiffness is achieved by virtue of the fact that an edge of the central region of the bridge and the lower edge of one of the branches near the latter bear against an edge of the printed circuit. This allows a nominal spacing of 14 mm between the lower edge of the branch and the last of four rows of contacts.

This design has the drawback that this branch of the bridge is not well protected during wave soldering, since that it comes into contact with the edge of the printed circuit.

An object of the present invention is a connector which does not have the aforementioned drawback.

SUMMARY OF THE INVENTION

The invention consists in a connector including an insulative bridge having a U-shape cross-section, i.e., a central region and two lateral branches, and elbow electrical contact members having front contact regions housed in openings of the central region of the bridge and elbow and rear contact regions, a retaining peg for fixing the connector to a flat support, and a rear insulative body surrounding the electrical contact members in at least an area between the front contact region and the elbow region, said retaining peg being fastened to one edge of the rear insulative body.

The rear insulative body stiffens the electrical contact members and, since the retaining peg, which can be deformable by heat or a force-fit ("press-fit") peg, for example, is no longer carried by the bridge, but rather by the rear insulative body, the bridge can be disposed differently relative to the printed circuit. Also, standard bridges can be used.

In a preferred embodiment of the invention, the edge of the rear insulative body is substantially aligned with an outer edge of a branch of the bridge. A connector can then be implemented by mounting the bridge so that the outer edge of the branch bears on an upper surface of a flat support such as a printed circuit board. As a result, the assembly is rigid, the bridge is on the side opposite that exposed to the effects of wave soldering, and the previously mentioned nominal spacing can be reduced, for example to approximately 10 mm.

In a second embodiment of the invention, the edge of the rear insulative body is set back relative to an outside edge of a branch of the bridge. A connector can then be implemented with the bridge spaced from an outer edge of the flat support. This prevents wetting of the bridge by a wave, soldering wave since the bridge is entirely outside the perimeter of the

printed circuit. In this case, the nominal spacing of 14 mm can be retained.

The invention will be better understood from the following description, given by way of example with reference to the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a METRAL prior art connector.

FIG. 2 shows a first embodiment of the invention.

FIG. 3 shows a second embodiment of the invention.

FIG. 4 shows one variant of the retaining peg, of the force-fit type.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in FIG. **1**, a connector marketed under the trademark METRAL has a rear part with elbow contact members. Each contact member has a termination **1** soldered to the lower side **18** of a printed circuit board **8**, a straight region connecting the termination **1** to an elbow region **6** and another straight region **5** extending from the elbow region **6** through a central region **2** of a "U" shape bridge **10**, the straight region **9** being extended towards the front by male terminations **9** disposed between the two lateral branches **3** and **4** of the bridge **10**. One lateral side of the central region adjoining the branch **3** bears against an upper side **17** of the printed circuit **8** and this side carries a peg **11** which can be deformed by heat and by means of which it is mechanically fastened to the lower surface **18** of the printed circuit **8** near its edge **19**. The rear side **15** of the lateral branch **3** bears against the edge **19** of the printed circuit **8** and absorbs rotation forces applied to the bridge **10**.

A connector **20** has a female front part **12**, a cable support **14** and a cable **16**.

The distance L1 between the side **15** of the branch **3** and the rear edge of the rearmost row of contact members is 14 mm. This distance is determined by various factors: the central region **2** must be sufficiently thick to provide the mechanical stiffness of the assembly and the peg **11** must be sufficiently far from the edge **15** of the branch **3** to enable the insertion of a tool for deforming the peg **11** by application of heat. In this latter regard, note that the plane external surface of the branch **3** projects beyond the lower surface **18** of the printed circuit **8**.

As shown in FIG. **2**, a connector according to the invention has at the rear an insulative body **40** having longitudinal openings **47** extended rearwards via a constriction area **42** and opening onto a surface **43** which in this example is inclined at substantially 45°. The contact members have a front terminal **49** constituted by a male terminal housed between the lateral branches **23** and **24** of a "U" shape bridge **30** whose central part **22** has through-openings **38** into which are force-fitted terminals **49** extended to the rear by a straight region **25** disposed in an opening **47** and to the rear of the constriction area **42** which holds it by an elbow region **26** and then another straight region **27** which ends at a contact (or terminal) region **21** which is a force-fit ("press-fit") in holes in a printed circuit **28**. The insulative body **41** has an extension **44** with one side **45** bearing on the upper surface **29** of the printed circuit **28** and carrying a peg **31** which can be deformed by heat to fasten the block **41** mechanically to the printed circuit **28**. The lateral branch **23** can have a surface **46** (an end surface as shown here, for example) which bears against the upper surface **29** of the

printed circuit **28**. The insulative block **40** contributes to the mechanical stiffness of the part of the connector to the rear of the bridge **30**. As a result, a standard bridge **30** can be used. Also, as the bridge **30** is mounted on the upper surface **29** of the printed circuit **28**, it is entirely protected during wave soldering. Finally, there is no longer any need for a tool insertion space as large as is required in the prior art. The distance L2 between the base of the bridge **30** and the rear surface **39** of the insulative body **40** can be in the order of 10 mm rather than 14 mm.

Because it is disposed on the insulative body **40** which holds the members (**25**, **26**, **27**, **21**), the peg **31** contributes to guiding of the terminals **21** when the latter are force-fitted into the holes in a printed circuit **28**.

Also, the connection between the bridge **30** and the rear insulative body **40** is strengthened by the fact that the force-fitted terminations **38** of the terminals **49** contribute to the nesting effect between extensions **37** of the insulation body **40** and extensions **36** of the bridge **30**.

The FIG. **3** embodiment uses a bridge **30** which can be identical to that of FIG. 2. The connector has a rear insulative body **50** without an extension like the extension **44**. The rear insulative body **50** carries on its surface **54** a peg **55** which can be deformed by heat to fasten it to a printed circuit **48**. The contact members have male terminals **59** housed between the lateral branches **23** and **24**, force-fitted at **68** and extended towards the rear by straight regions **65** longer than the regions **25** in FIG. **2**, then elbow regions **66** and finally by further straight regions **67** which are shorter than the regions **27** in FIG. **2**. The bridge **30** and the rear insulation **50** can be nested at **36** for the bridge **30** and at **62** for the rear insulative body **50**.

With a distance L3 greater than L2, for example L3=14 mm, the bridge **30** is spaced from the edge **63** of the printed circuit **48**. It is therefore possible to carry out a wave soldering operation with no risk of wetting the lateral branch **23** of the bridge **30**. Remember that during this operation the solder wave must be able to lap the lateral edges of the printed circuit **48**.

Another advantage of the FIG. **2** and **3** embodiments is that the respective rear insulative body **40** and **50** supports the respective terminals **21** and **61** when they are inserted into the holes in the respective printed circuit **28** and **48**.

In an alternative embodiment, the male terminals **49** and **59** are replaced by female terminals.

As shown in FIG. **4**, the insulative body **40** or **50** has a cylindrical peg **130** including a cylindrical region **131**, at least one housing **133** and a frustoconical end **132**. The cylindrical peg **130** is fastened to the insulative body **40** or **50** and is manufactured in a similar way to a peg that can be deformed by heat. A metal part **120** has a hollow cylindrical body **124** including a notch **126** and at least one spring arm **122** adapted to snap into the housing **133**. The part **120** has a bottom end **125** abutting the base of the peg **130** and an upper end **129** extended by spring arms **123**; in this example there are three arms at 120°, but there could be four arms at 90°, for example. The elastic arm **123** has a proximal region **127** extending outwards and a distal region **123'** at right angles to the region **127**, the distal region **123'** being directed inwards. The proximal region **127** provides a snap-fastener abutment to hold the printed circuit **28** or **48** abutted against an upper side of the insulative body **40** or **50**. To attach a printed circuit to an insulative body having one or more cylindrical pegs **130**, the cylindrical body **124** is first inserted until the tongues **122** snap into the housings **133**. Then the opening (or the openings) **121** of the printed circuit **40** or **50** is (or are) offered up to the distal end **123'** of the spring arms **123**. The spring arms **123** are pushed in, enabling insertion of the printed circuit **40** or **50** until it abuts against the surface of the insulative body **40** or **50** in a position in which the proximal end **127** is snap-fastened by resilient outward deployment of the arms **123**. The diameter of the peg **130** can be in the order of 1 mm.

The metal part **120** can be demounted by pivoting it around the axis of the hollow cylinder **124** in order to disengage the elastic arm(s) **122** from the housing(s) **133**.

There is claimed:

1. Connector including an insulative bridge having a U-shape cross-section, said bridge comprising a central region and two lateral branches, and elbow electrical contact members having front contact regions force-fitted in through openings of the central region of the bridge, and extended rearwardly by straight regions, a rear insulative body assembled to said bridge, elbow regions joining said straight regions and holding together said U-shaped bridge and said rear insulative body, and rear contact regions, a retaining peg for fixing the connector to a flat support, said rear insulative body surrounding said electrical contact members in at least one area between said front contact region and said elbow region, said retaining peg being fastened to one side of said rear insulative body.

2. Connector according to claim **1**, wherein said retaining peg can be deformed by heat.

3. Connector according to claim **1**, wherein said retaining peg is of a force-fit type.

4. Connector according to claim **1**, wherein said edge of said rear insulative body is substantially aligned with an outside edge of a branch of said bridge.

5. Connector according to claim **4**, wherein said rear insulative body includes an extension including said edge.

6. Connector according to claim **1**, wherein said edge of said rear insulative body is set back relative to an outside edge of a branch of said bridge.

7. Connector according to claim **1**, wherein said bridge and said rear insulative body are assembled together by nesting.

8. Connector according to claim **1**, wherein said retaining peg is fastened to one side of said rear insulative body substantially aligned with an outer side of a branch of said bridge, and said outer side of said branch of said bridge bears against said flat support.

9. Connector according to claim **1**, wherein said side of said rear insulative body is set back relative to an outer side of a branch of said bridge, and said bridge is spaced from a side of said flat support.

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